

(12) **United States Patent**
Bennett et al.

(10) **Patent No.:** **US 9,448,708 B1**
(45) **Date of Patent:** **Sep. 20, 2016**

(54) **THEMING FOR VIRTUAL
COLLABORATION**

(75) Inventors: **David Scrymgeour Bennett**, Issaquah,
WA (US); **Eduardo Fernandez**,
Bothell, WA (US); **Richard James
Dunn**, Seattle, WA (US); **Nikhyl P.
Singhal**, Menlo Park, CA (US)

(73) Assignee: **Google Inc.**, Mountain View, CA (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 301 days.

(21) Appl. No.: **13/554,807**

(22) Filed: **Jul. 20, 2012**

Related U.S. Application Data

(60) Provisional application No. 61/549,074, filed on Oct.
19, 2011.

(51) **Int. Cl.**
G06F 3/00 (2006.01)
G06F 3/0484 (2013.01)

(52) **U.S. Cl.**
CPC **G06F 3/04847** (2013.01); **G06F 3/0484**
(2013.01)

(58) **Field of Classification Search**
CPC G06F 17/30867; G06F 3/048; G06F
3/0484; G06F 3/04847
USPC 715/756
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,185,054 B1 * 2/2007 Ludwig et al. 709/204
7,188,143 B2 3/2007 Szeto

7,685,237 B1 * 3/2010 Weaver et al. 709/205
8,520,050 B2 * 8/2013 Blackburn et al. 348/14.01
2008/0225111 A1 * 9/2008 Honobe 348/14.05
2008/0238929 A1 * 10/2008 Abdo et al. 345/581
2008/0300908 A1 * 12/2008 Hunter et al. 705/1
2009/0049395 A1 * 2/2009 Lee et al. 715/765
2009/0248824 A1 * 10/2009 Best et al. 709/206
2009/0307058 A1 * 12/2009 Murphy 705/10
2011/0078591 A1 * 3/2011 van Os et al. 715/756
2011/0249074 A1 * 10/2011 Cranfill et al. 348/14.02
2012/0030594 A1 * 2/2012 Yokoyama et al. 715/765
2013/0125013 A1 * 5/2013 Lettau et al. 715/748

OTHER PUBLICATIONS

FT Facebook Themes, "Add Themes to Your Facebook Profile,"
retrieved from <http://facebookthemes.org/>, accessed on Jul. 12,
2011, 2 pp.

Facebook Themes, "Facebook Theme Service," retrieved from
<http://www.facebook-themes.info/>, accessed on Jul. 12, 2011, 2 pp.

* cited by examiner

Primary Examiner — Kieu Vu

Assistant Examiner — Andrew Chung

(74) *Attorney, Agent, or Firm* — Remarck Law Group PLC

(57) **ABSTRACT**

Aspects of the disclosure provide techniques that enable a
communication server hosting a virtual communication ses-
sion to receive theme parameters from a remote server to
control the look and feel of the virtual communication
session. In one example, a method includes sending a
plurality of video feeds for display at a plurality of graphical
user interfaces (GUIs) of client devices coupled to a com-
munication session. The communication session enables
communication among a plurality of users of the client
devices. The method also includes receiving a set of param-
eters of a theme to modify one or more visual properties of
the GUIs. The method also includes sending the set of
parameters to the client devices connected to the commu-
nication session to modify visual properties of the GUIs
displaying the plurality of video feeds at the plurality of
client devices based on the parameters of the theme.

22 Claims, 5 Drawing Sheets

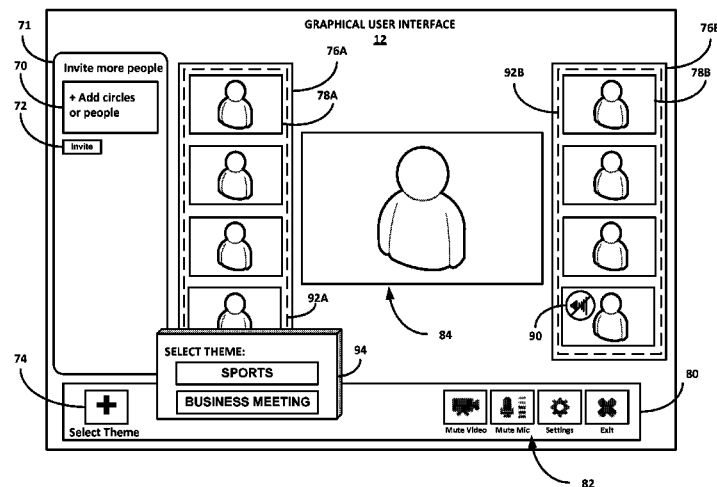
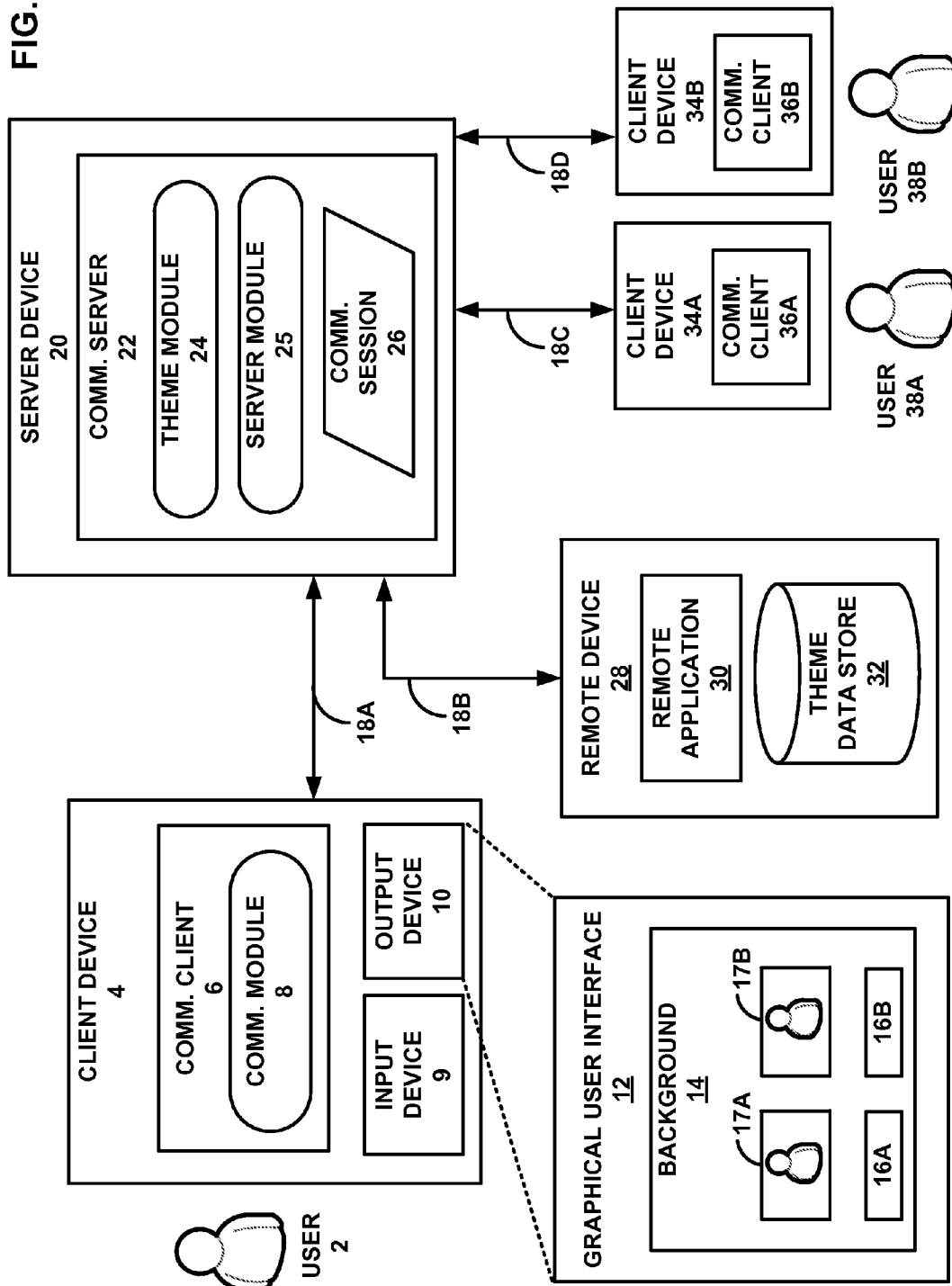


FIG. 1



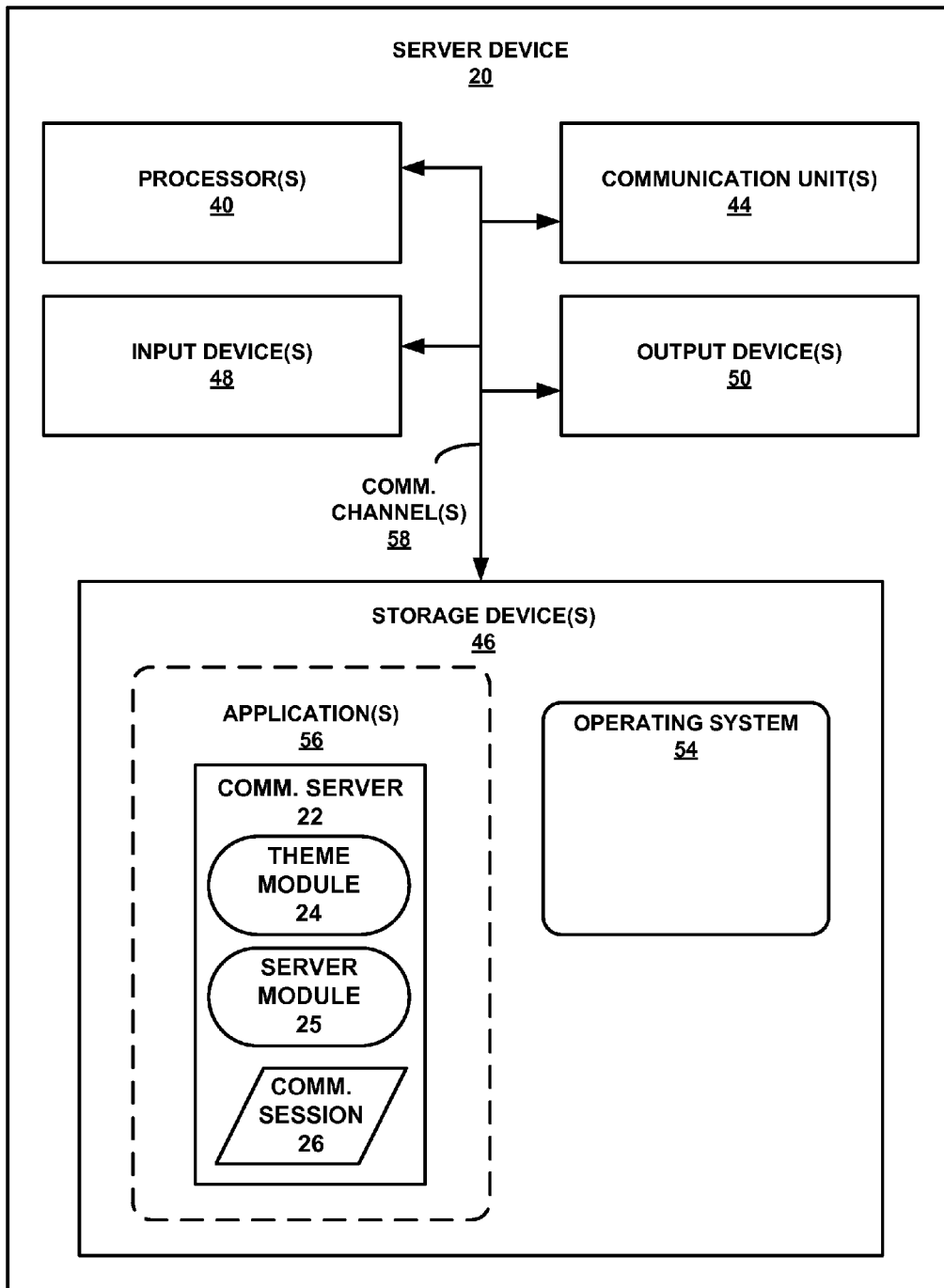


FIG. 2

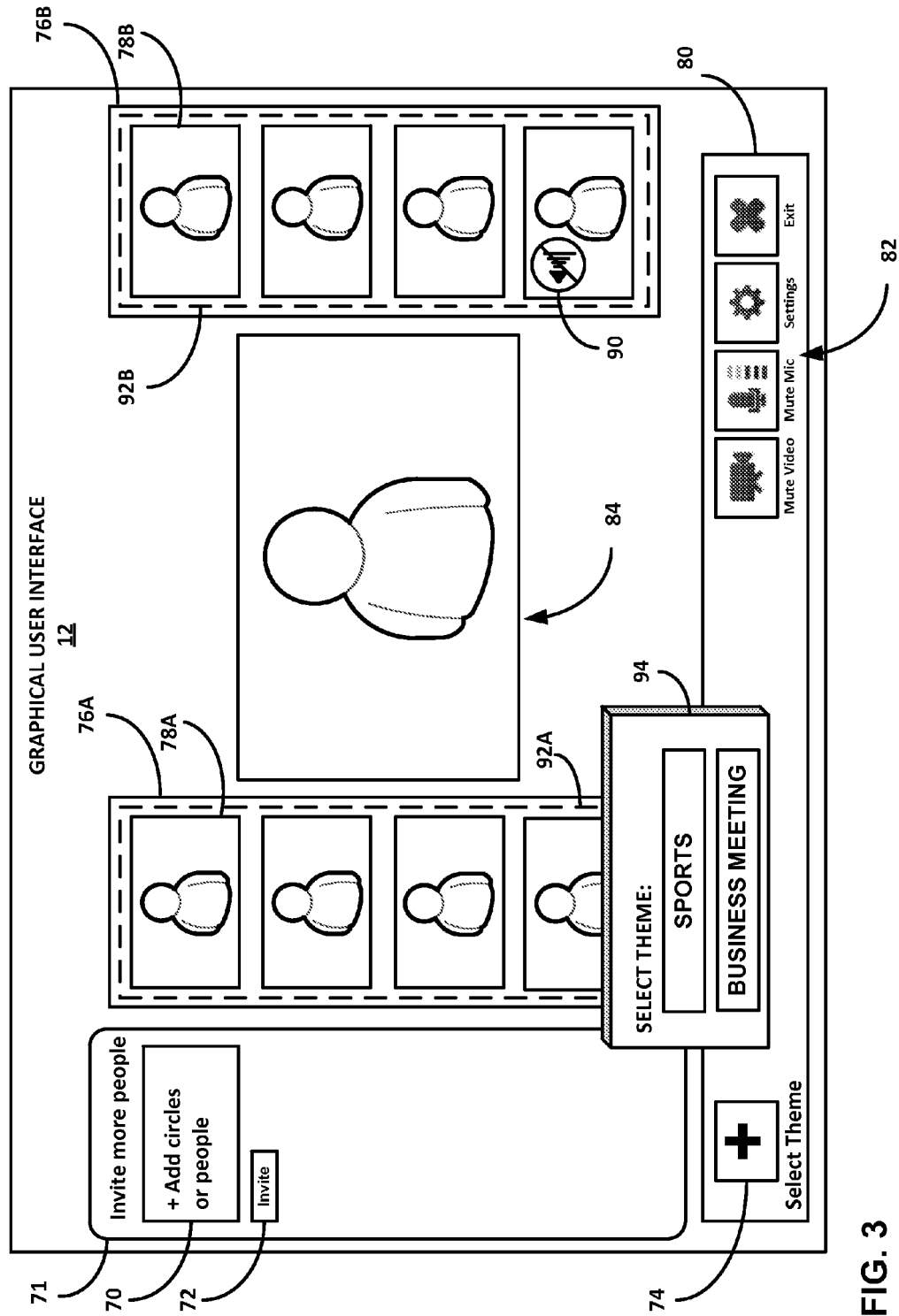


FIG. 3

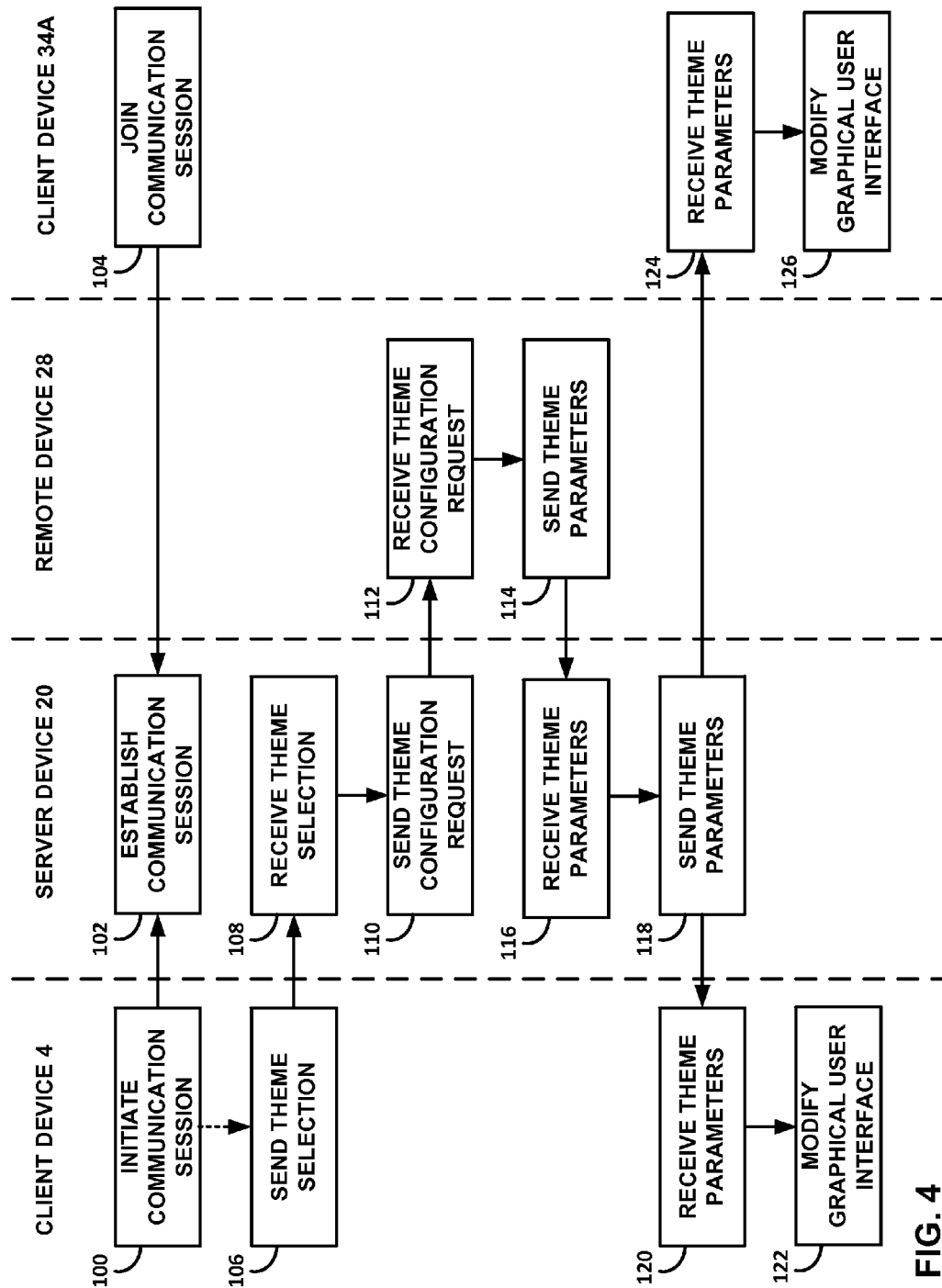


FIG. 4

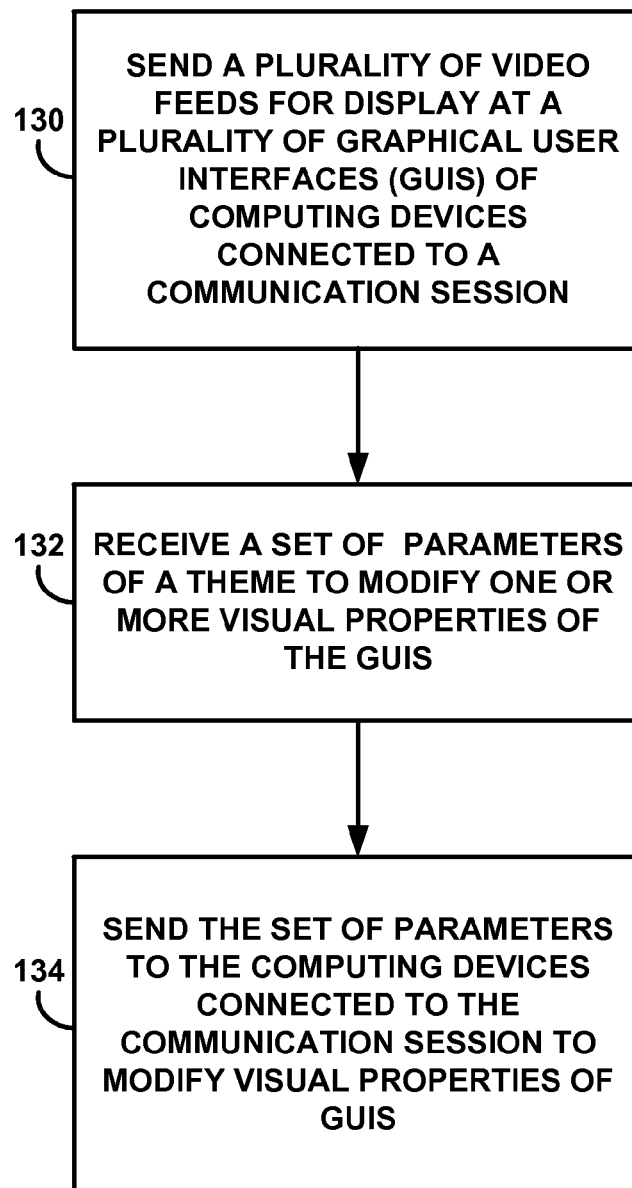


FIG. 5

1

THEMING FOR VIRTUAL COLLABORATION

RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application No. 61/549,074, filed Oct. 19, 2011, the entire content of which is incorporated herein in its entirety.

TECHNICAL FIELD

The disclosure relates to virtual socializing over a network and, more specifically, to configuring client interfaces used for virtual socializing.

BACKGROUND

Multiple users of computing devices may often engage in real-time video communications, such as video conferencing, where the users (also referred to as participants) exchange live video and audio transmissions. In some examples, visual representations of the users may be shared with each user engaged in real-time video communications. Each computing device associated with a user may include a client that enables the real-time video communication. In some instances, the client may include a graphical interface that displays the visual representations of each of the users.

SUMMARY

In one example, a method includes sending, by one or more computing devices, a plurality of video feeds for display at a plurality of graphical user interfaces (GUIs) of client devices coupled to a communication session. The communication session enables communication among a plurality of users of the one or more computing devices, and each of the plurality of video feeds includes at least a visual representation of user participation in the communication session. The method also includes, receiving, by the one or more computing device, a set of parameters of a theme to modify one or more visual properties of the GUIs. The method also includes sending, by the one or more computing device, the set of parameters to the client devices coupled to the communication session to modify visual properties of the GUIs displaying the plurality of video feeds at the plurality of client devices based on the parameters of the theme.

In one example, a computer-readable storage medium includes instructions that, when executed, cause one or more processors to perform operations including, sending a plurality of video feeds for display at a plurality of graphical user interfaces (GUIs) of client devices coupled to a communication session. The communication session enables communication among a plurality of users of the client devices, and each of the plurality of video feeds includes at least a visual representation of user participation in the communication session. The computer-readable storage medium further includes instructions that, when executed, cause one or more processors to perform operations including, receiving a set of parameters of a theme to modify one or more visual properties of the GUIs. The computer-readable storage medium further includes instructions that, when executed, cause one or more processors to perform operations including sending the set of parameters to the client devices connected to the communication session to

2

modify visual properties of the GUIs displaying the plurality of video feeds at the plurality of client devices based on the parameters of the theme.

In one example, a computing device includes one or more processors. The computing device further includes a server module configured to send a plurality of video feeds for display at a plurality of graphical user interfaces (GUIs) of client devices coupled to a communication session. The communication session enables communication among a plurality of users of the client devices, and each of the plurality of video feeds includes at least a visual representation of user participation in the communication session. The computing device also includes a theme module configured to receive a set of parameters of a theme to modify one or more visual properties of the GUIs. The server module is also configured to send the set of parameters to the client devices connected to the communication session to modify visual properties of the GUIs displaying the plurality of video feeds at the plurality of client devices based on the parameters of the theme.

The details of one or more examples are set forth in the accompanying drawings and the description below. Other features, objects, and advantages will be apparent from the description and drawings, and from the claims.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a block diagram illustrating an example of one or more client devices connected to a communication session that enables communication among users, in accordance with one or more aspects of the present disclosure.

FIG. 2 is a block diagram illustrating further details of one example of a server device shown in FIG. 1, in accordance with one or more aspects of the present disclosure.

FIG. 3 is a block diagram illustrating one example of a graphical display of a communication client, in accordance with one or more aspects of the present disclosure.

FIG. 4 is a flowchart illustrating an example operation that includes a server device that sends parameters to computing devices connected to a communication session to modify visual properties of GUIs displayed at each of the computing devices, in accordance with one or more aspects of the present disclosure.

FIG. 5 is a flow diagram illustrating an example operation that may be performed by a computing device to send a set of parameters to computing devices connected to a communication session to modify visual properties of GUIs displayed at each of the plurality of computing devices, in accordance with one or more aspects of the present disclosure.

DETAILED DESCRIPTION

Overview

Friends, family members, or other individuals who wish to socialize or otherwise communicate may not always be in the same physical location at the time they would like to communicate. Some individuals may rely upon telephonic, text, or other forms of communication that support limited forms of socializing. For example, conventional forms of communication may support multi-way audio and/or video communication. However, some forms of communication are not sufficient to be able to give the individuals an experience similar to actually socializing in person. Talking with someone over the phone or texting someone does not create a shared experience similar to sitting a room together watching a movie or playing a game.

3

Rather than interacting together in the same physical location, techniques of this disclosure may, in various instances, provide a mechanism for two or more individuals to socialize in the same virtual location (e.g., a virtual communication session). A virtual communication session is a virtual space where multiple users can engage in a conversation and/or share information. For example, the individuals participating in the virtual hangout may share and watch videos, play games, participate in video, audio, or text chat, surf the web, or any combination thereof. In other words, techniques of this disclosure may enable the creation of a virtual hangout that may mirror the experience of individuals hanging out in the same physical location.

Users may connect to the virtual communication session using a communication client that displays one or more video feeds of other users participating in the virtual communication session. Each communication client connected to the communication session may include the same or substantially similar GUI thereby providing a common look and feel for the virtual communication session. The communication client may cause an output device to display graphical elements (e.g., video feeds) in a graphical user interface (GUI) that include one or more visual properties. Visual properties of a GUI may include the size, position, and appearance of graphical elements included in the GUI.

Aspects of the disclosure provide techniques that enable a user to select themes that modify visual properties of a GUI. For instance, a theme may include one or more parameters that may modify visual properties of a GUI. By allowing users to apply themes that modify visual properties of the GUI, users may create and select different configurations for different virtual communications sessions. Allowing users to create and select different configurations for different virtual communications sessions may improve the customizability of the visual communication session and the user experience.

Aspects of the disclosure further provide techniques that enable a communication server hosting a virtual communication session to receive theme parameters from a remote server to control the look and feel of the virtual communication session. For instance, a remote server may include an application that sends parameters of a theme to an interface provided by the communication server. The parameters may in turn be sent by the communication server to each of the communication clients connected to the session thereby causing visual properties of the GUIs displayed at each of the client devices to be modified concurrently. In this way, a common look and feel of the virtual configuration session may be configured by a remote server that specifies one or more themes.

As used throughout this disclosure, headings are included to improve the clarity of the disclosure and are not used to define separate examples. In some examples, features of various examples may be combined and/or used from among multiple headings in accordance with aspects of the present disclosure.

Example System

FIG. 1 is a block diagram illustrating an example of one or more client devices connected to a communication session that enables communication among users, in accordance with one or more aspects of the present disclosure. FIG. 1 includes client devices 4 and 34, server device 20, and remote device 28. Client device 4 includes input device 9, output device 10, and communication client 6, which further includes communication module 8. Communication client 6 may further cause output device 10 to display graphical user interface (GUI) 12. GUI 12 may further

4

include background 14, video feed 17, and control buttons 16A, 16B. Client devices 34A, 34B are computing devices similar to client device 4 and further include respective communication clients 36A, 36B similar to communication client 6.

As shown in FIG. 1, server device 20 includes communication server 22, theme module 24, server module 25, and communication session 26. Remote device 28 includes remote application 30 and theme data store 32. Each of client devices 4 and 34, server device 20, and remote device 28 may be connected by communication channels 18, which in some examples may be wired or wireless communication channels capable of sending and receiving data. One example of communication channel 18 may include a Transmission Control Protocol and/or Internet Protocol (TCP/IP) network connection.

Client devices 4 and 34 may be communicatively coupled to a communication session 26 that enables communication among users of client devices 4 and 34, in accordance with one or more aspects of the present disclosure. Examples of client devices 4 and 34, may include, but are not limited to, portable or mobile devices such as mobile phones (including smart phones), laptop computers, personal digital assistants (PDAs), portable gaming devices, portable media players, televisions or similar such devices with one or more processors attached thereto, or embedded therein and e-book readers. Client device 4 and each of client devices 34 may be the same or different types of devices. For example, client device 4 and client device 34A may both be mobile phones. In another example, client device 4 may be a mobile phone and client device 34A may be a desktop computer.

Client devices 4 and 34 may include one or more input devices 9. Input device 9 may include keyboards, pointing devices, microphones, and cameras capable of recording one or more images or video. Client devices 4 and 34 may also include output devices 10. Examples of output device 10 may include a video graphics card, computer display, sound card, and speakers.

Client devices 4 and 34 of FIG. 1 may include communication clients 6 and 36. Communication clients 6 and 36 may provide similar or the same functionality. In some examples, communication clients 6 and 36 may include mobile or desktop computer applications that provide functionality described herein. Communication clients 6 and 36 may include communication modules such as communication module 8 as shown in communication client 6. Communication clients 6 and 36 may exchange audio, video, text, or other information with other communication clients connected to communication session 26. Communication module 8 may cause output device 10 to display GUI 12. Communication module 8 may further include functionality that enables communication client 6 to connect to communication server 22 and join one or more communication sessions (e.g., communication session 26). Two or more client devices (e.g., client device 4 and client device 34) may join the same communication session 26 to enable communication among the client devices.

GUI 12 may include graphical elements such as background 14, video feeds 17, and control buttons 16. Graphical elements may include any visually perceivable object that may be displayed in GUI 12. Examples of graphical elements may include a background image, video feed, text, control buttons, input fields, or scroll bars. In one example, input device 9 may generate a visual representation of user 2. A visual representation may be a still image or group of images (e.g., a video). Communication client 6 may send the visual representation to communication server 22, which

5

may determine that communication clients **6** and **36** are connected to communication session **26**. Consequently, communication server **22** may send the visual representation of user **2** to communication clients **36A** and **36B** as video feeds. Communication clients **36A** and **36B** may, upon receiving the visual representation, cause an output device of client devices **34A** and **34B** to display the video feeds. Similarly, client device **4** may receive visual representations of users **38A** and **38B**, which are in turn included as video feeds **17A** and **17B** in GUI **12** of client device **4**.

In addition to exchanging video information, the communication clients may exchange audio, text and other information via communication session **26**. For instance, microphones may capture sound at or near each of client devices **4** and **34**, for example, voices of users **2** and **38**. Audio data generated by client devices **4** and **34** from the sound, may be exchanged between communication clients connected to communication session **26** of communication server **22**. For instance, if user **4** speaks, input device **9** may receive the sound and convert it to audio data. Communication client may then send the audio data to communication server **22**. Communication server **22** may determine communication client **6** is connected to communication session **26** and further determine other communication clients connected to communication session **26**. Upon determining that communication clients **36A** and **36B** are connected to communication session **26**, communication server **22** sends the audio data to each of communication clients **36**. In still other examples, text such as a real-time instant messages or files may be exchanged between communication clients **6** and **36** using similar techniques.

As shown in FIG. **1**, server device **20** includes communication server **22**, theme module **24**, server module **25** and communication session **26**. Examples of server device **20** may include a personal computer, a laptop computer, a handheld computer, a workstation, a data storage system, a supercomputer, or a mainframe computer. Communication server **22** may generate, manage, and terminate communication sessions such as communication session **26**. In some examples, communication server **22** is an application executing on server device **20** that performs operations described herein. Server device **20** may execute with multiple processors, may have functionality distributed across multiple machines, etc. Server device **20** may also execute as a virtual machine executing on underlying hardware (which itself may be a single or multiple machines). Server device **20** may also execute as a process, or a set of processes, on a cloud server or service.

In one example, server module **25** of communication server **22** may receive a request to generate communication session **26**. For instance, communication client **6** may send a request to communication server **22** that causes server module **25** to generate communication session **26**. Upon generating communication session **26**, other communication clients such as communication clients **36** may also connect to communication session **26**. For instance, user **2** may cause communication client **6** to send invitations to client devices **34A** and **34B** of users **38A** and **38B**. Upon receiving the invitations, users **38A** and **38B** may cause communication clients **36A** and **36B** to send requests to communication server **22** to join communication session **26**. Server module **25**, upon receiving the requests, may connect communication clients **36** to communication session **26**. In other examples, users **38A** and **38B** may discover communication session **26** by browsing a feed that includes an indicator

6

identifying communication session **26**. Users **38** may similarly join communication session **26** by sending requests to communication server **22**.

Communication session **26** may enable communication clients connected to communication session **26** to exchange information. As such, communication session as used herein is a broad term encompassing as its plain and ordinary meaning, including but not limited to, one or more objects, which may be stored in and/or are executable by software or hardware, that may enable communication clients coupled to the one or more objects to exchange information. Communication session **26** may include data that, among other things, specifies communication clients connected to communication session **26**. Communication session **26** may further include session information such as a duration of the communication session, security settings of the communication session, and any other information that specifies a configuration of the communication session. Server module **25** may send and receive information from communication clients connected to communication session **26** thereby enabling users participating in the communication session to exchange information. Communication server **22** may also include a theme module **24** implementing techniques of the present disclosure.

In some examples, communication client **6** may cause output device **10** to display GUI **12**. As previously described, GUI **12** may include graphical elements such as background **14**, video feeds **17**, and control buttons **16**. Visual properties of GUI **12** may include the size, position, and appearance of graphical elements included in GUI **12**. For instance, a visual property of video feed **17A** may include a size of video feed **17A**, e.g., 540x480 pixels. A different visual property of video feed **17A** may include a position of video feed **17A** within GUI **12** specified by a coordinate pair comprising an x-axis value and a y-axis value. Other visual properties may include chrominance and luminance effects applied to a graphical element. Still other visual properties may include text or other objects that are superimposed on a graphical element (e.g., text or objects that are superimposed on video feed **17A**). Generally, a visual property as used herein is a broad term encompassing as its plain and ordinary meaning, including but not limited to any characteristic of a graphical element that, when modified, results in a visually perceptible change in a graphical element.

Visual properties may be modified by one or more parameters. In some examples, a parameter may identify a graphical element of a GUI and include data that specifies a modifier of one or more visual properties. In some examples, the parameter may identify a type of graphical element, such as a control button type. The type of graphical element may be associated with a modifier, such as a specified color to be applied to the graphical element. In this way, a parameter may modify one or more visual properties of multiple graphical elements of the same type. In other examples, a parameter may identify a graphical element of a GUI by a unique identifier of the graphical element. For instance, each control button in a GUI may include a unique identifier. A parameter may specify an identifier that unique identifies the graphical element and a modifier of one or more visual properties of the visual element. In this way, parameters, generally, may be applied to groups of graphical elements or individually to specific graphical elements. When a communication client receives a parameter, the communication client may apply the modifier of the parameter to one or more graphical elements in the GUI generated by the

7

communication client. In this manner, parameters may modify visual properties of graphical elements included in the GUI.

In some examples, a theme may include a set of one or more parameters. Themes may therefore specify a configuration of one or more parameters that modify one or more visual properties of graphical elements included in a GUI. Themes may further include one or more triggers that specify when a parameter is to be applied to a graphical element. For instance, a trigger may specify that a parameter is to be applied to a graphical element at a particular time, day, or season. In other examples, a trigger may specify that a parameter is to be applied to a graphical element upon the occurrence of an event (e.g., a user joining a communication session). A trigger, generally, may specify a condition that, when satisfied, indicates a parameter to be applied to a graphical element. In one example a condition may be satisfied when an event matches a condition specified by a trigger.

Themes may further include and or specify locations of graphical content that may be applied to one or more graphical elements. Graphical content may include text, images, or any other visually perceptible effect or object. In some examples, the graphical content may be stored on a remote device, and the theme may specify the location of the graphical content. For instance, a location may be specified by a Uniform Resource Locator (URL). Thus in one example, the location of a background image stored on a remote device may be specified by a parameter. When the parameter is applied to the GUI generated by the communication client, the background image may be retrieved from the remote device.

In some examples, themes may specify one or more groups and parameters may be associated with each group. A group may, for example, be a group of users. If a user is associated with a group, the parameters that are associated with the group may be applied to the GUIs of users included in the group that are participating in a communication session. Themes may, in some examples, be specified as structured information in a document such as an Extensible Markup Language (XML) document. In other examples, themes may be stored in a datastore such as a database or other data structure.

As shown in FIG. 1, communication server 22 may include theme module 24. In some examples, theme module 24 may receive and send theme parameters to communication clients connected to a communication session thereby causing visual properties of the GUIs displayed at each of the client devices to be modified concurrently. In this way, a common look and feel of the virtual communication session may be included in the GUI of each communication client connected to the communication session. For instance, as shown in FIG. 1, communication clients 6 and 36 may be connected to communication session 26. User 2 may provide a user input via input device 9 that causes communication module 8 to select a theme stored on client device 4. Upon selecting the theme, communication module 8 may apply the parameters of the theme to communication client 6 thereby modifying visual properties of the graphical elements included GUI 12.

Communication module 8 may further send parameters of the theme to communication server 22. Theme module 24 may receive the parameters and further send a message to server module 25 to determine that communication clients 36A and 36B are connected to communication session 26. Consequently, theme module 24 may send the parameters of the theme to each of client devices 34A and 34B. Upon

8

receiving the parameters, communication clients 36A and 36B may apply the parameters to graphical elements in GUIs generated by communication clients 36A and 36B. In this way, a common look and feel of the virtual communication session may be included in the GUI of each communication client connected to the communication session.

In some aspects of the present disclosure, themes may be stored on and/or applied by a remote device 28. Examples of remote device 28 may include a personal computer, a laptop computer, a handheld computer, a workstation, a data storage system, a supercomputer, or a mainframe computer. Remote device 28 may further include a remote application 30 and theme data store 32. Theme data store 32 may be a database, file or any other data structure capable of storing a theme and/or parameters of a theme as described herein.

In some examples, user 2 may use communication client 6 to send a message to communication server 22 to select a theme stored on remote device 28. For instance, communication client 6 may send a message to communication server 22 requesting a set of themes that may be selected by communication client 6. Theme module 24, upon receiving the request, may send a message to remote device 28 requesting a set of themes included in theme data store 32. Remote application 30, executing on remote device 28, may generate a set of theme identifiers that identify the themes stored in theme data store 32. Remote application 30 may then send the set of theme identifiers to server device 20. Theme module 24 may send a message to communication client 6 that includes the set of theme identifiers. Communication client 6, upon receiving the identifiers may cause output device 10 to display a menu that includes the identifiers. User 2 may provide a user input via input device 9 to communication client 6 to select one or more of the theme identifiers included in the message. Responsive to receiving the user input, communication client 6 may send a message that indicates the selected one or more theme identifiers to communication server 22.

Theme module 24 may send a message to remote device 28 that requests parameters of the one or more themes selected by 2. Remote application, upon receiving the message may select the parameters from theme data store 32. Remote application 32 may then send the parameters to communication server 22. Theme module 24, upon receiving the parameters, may send a message to server module 25, which queries session data of communication session 26, to determine that communication clients 6, 36A, and 36B are connected to communication session 26. Consequently, theme module 24 sends the parameters to communication clients 6, 36A and 36B. Each of communication clients 6, 36A, and 36B, upon receiving the parameters, may apply the parameters to graphical elements included in GUIs generated by each of the communications clients. In this way, a remote device 28 that specifies one or more themes may configure a common look and feel of the configuration session 26.

In some examples, remote application 30 may manage the application of themes to communication clients that are connected to a communication session. For instance, remote device 28 may “push” parameters of a theme to an interface, such as an Application Programming Interface (API), of communication server 22, which in turn may send the parameters to each of the communication clients. In one example, user 2 may select a theme stored on remote device 28 as previously described. Consequently, remote device 28 may send a message from communication server 22 that indicates the one or more themes selected by user 2. In addition, theme module 24 may include a communication

session identifier that uniquely identifies communication session 26 in the message. Upon receiving the message, remote application 30 may select the themes identified by the message and send parameters to communication server 22. In various instances, the selected themes may include one or more triggers as further described in the disclosure. In these instances, if the triggers included in the theme are later satisfied, remote application 30 may send a message that includes the parameters associated with the trigger to communication server 22. Remote application 30 may include the session identifier in the message such that theme module 24 may send the parameters to each communication client associated with communication session 26. In this way, remote application 30 may manage and apply one or more selected themes to a communication session via an API provided by communication server 22.

In some examples, when remote application 30 manages the application of themes to communication clients, communication server 22 may send events to remote application 30. For instance, a theme managed by remote application 30 may include a trigger based on a user joining a communication session. In such an example, theme module 24 may initially receive a message from server module 25 when the new user joins communication session 26. Theme module 24 may send the event that indicates the new user has joined the session to remote application 30. Remote application 30, upon receiving the event, may determine whether the event indicates that a trigger of the theme has occurred. If the event indicates a trigger has occurred, remote application 30 may send one or more parameters associated with the theme to theme module 24. Theme module 24 may, in turn, send the parameters to each of the communication clients connected to communication session 26. In this way, events that occur during communication session 26, which are associated with triggers in a theme may be sent to remote device 28.

Although previous examples herein have described themes stored on client device 4 and remote device 28, themes may also be stored on server 20 and applied similarly using theme module 24. For instance, remote application 30 may send a theme to communication server 22. Theme module 24, upon receiving the theme, may send parameters of the theme to one or more communication clients connected to communication session 26. Moreover, theme module 24 may determine events associated triggers have occurred, e.g., a user joining communication session 26. Theme module 24 may send parameters of themes associated with such events to communication clients as described similarly with respect to remote application 30. In this way, a common look and feel of the configuration session 26 may be configured by communication server 22 that stores one or more themes.

Example Device

FIG. 2 is a block diagram illustrating further details of one example of a server device shown in FIG. 1, in accordance with one or more aspects of the present disclosure. FIG. 2 illustrates only one particular example of server device 20, and many other example examples of server device 20 may be used in other instances.

As shown in the specific example of FIG. 2, server device 20 includes one or more processors 40, a communication unit 44, one or more storage devices 46, input device 48, and output device 50. Server device 20 also includes an operating system 54 that is executable by server device 20. Server device 20, in one example, further includes communication server 22 that is also executable by server device 20. Each of components 40, 44, 46, 48, 50, 54, and 56 may be interconnected (physically, communicatively, and/or opera-

tively) for inter-component communications. In some examples, communication channels 58 may include a system bus, network connection, interprocess communication data structure, or any other channel for communicating data. As one example in FIG. 3, components 40, 44, 46, 48, and 50 may be coupled by one or more communication channels 58. Applications 56 (including communication server 22, theme module 24, server module 25, communication session 26) and operating system 94 may also communicate information with one another as well as with other components in server device 20.

Processors 40, in one example, are configured to implement functionality and/or process instructions for execution within server device 20. For example, processors 40 may be capable of processing instructions stored in memory 42 or instructions stored on storage devices 46. Examples of processors 40 may include, any one or more of a microprocessor, a controller, a digital signal processor (DSP), an application specific integrated circuit (ASIC), a field-programmable gate array (FPGA), or equivalent discrete or integrated logic circuitry.

Storage device 46, in one example, is configured to store information within server device 20 during operation. Storage device 46, in some examples, is described as a computer-readable storage medium. In some examples, storage device 46 is a temporary memory, meaning that a primary purpose of storage device 46 is not long-term storage. Storage device 46, in some examples, is described as a volatile memory, meaning that storage device 46 does not maintain stored contents when the computer is turned off. Examples of volatile memories include random access memories (RAM), dynamic random access memories (DRAM), static random access memories (SRAM), and other forms of volatile memories known in the art. In some examples, storage device 46 is used to store program instructions for execution by processors 40. Storage device 46, in one example, is used by software or applications running on server device 20 (e.g., applications 56) to temporarily store information during program execution.

Storage devices 46, in some examples, also include one or more computer-readable storage media. Storage devices 46 may be configured to store larger amounts of information than memory 42. Storage devices 46 may further be configured for long-term storage of information. In some examples, storage devices 46 include non-volatile storage elements. Examples of such non-volatile storage elements include magnetic hard discs, optical discs, floppy discs, flash memories, or forms of electrically programmable memories (EPROM) or electrically erasable and programmable (EEPROM) memories.

Server device 20, in some examples, also includes a communication unit 44. Server device 20, in one example, utilizes communication unit 44 to communicate with external devices via one or more networks, such as one or more wireless networks. Communication unit 44 may be a communication unit card, such as an Ethernet card, an optical transceiver, a radio frequency transceiver, or any other type of device that can send and receive information. Other examples of such communication units may include Bluetooth®, 3G and WiFi® radios in mobile computing devices as well as USB. In some examples, server device 20 utilizes communication unit 44 to wirelessly communicate with an external device such as remote device 28 and client devices 4 and 34 of FIG. 1, a mobile phone, or other networked computing device.

Server device 20, in one example, also includes one or more input devices 48. Input device 48, in some examples,

11

is configured to receive input from a user through tactile, audio, or video feedback. Examples of input device **48** include a presence-sensitive screen, a mouse, a keyboard, a voice responsive system, video camera, microphone or any other type of device for detecting a command from a user. In some examples, a presence-sensitive screen includes a touch-sensitive screen.

One or more output devices **50** may also be included in server device **20**. Output device **50**, in some examples, is configured to provide output to a user using tactile, audio, or video stimuli. Output device **50**, in one example, includes a presence-sensitive screen, a sound card, a video graphics adapter card, or any other type of device for converting a signal into an appropriate form understandable to humans or machines. Additional examples of output device **50** include a speaker, a cathode ray tube (CRT) monitor, a liquid crystal display (LCD), or any other type of device that can generate intelligible output to a user.

Server device **20** may include operating system **54**. Operating system **54**, in some examples, controls the operation of components of server device **20**. For example, operating system **54**, in one example, facilitates the interaction of communication server **22** with processors **40**, communication unit **44**, storage devices **46**, input device **48**, and output device **50**. As shown in FIG. 2, communication server **22** may include theme module **24**, server module **25**, and communication session **26**, as described in FIG. 1. Communication server **22**, theme module **24**, and server module **25** may each include program instructions and/or data that are executable by server device **20**. For example, theme module **24** and server module **25** may include instructions that cause communication server **22** executing on server device **20** to perform one or more of the operations and actions described in the present disclosure.

In one example, communication unit **44** may receive multiple video feeds from communication clients connected to communications session **26**. As such, a video feed as used herein is a broad term encompassing as its plain and ordinary meaning, including but not limited to one or more visual representations associated with a communication client coupled to a communication session. For instance, a video feed may include one or more visual representations of user participation associated with a communication client that is coupled to a communication session. Upon receiving the video feeds, server module **25** may determine which communication clients are connected to communication session **26**. Server module **25** may cause network device **44** to send the video feeds to each of the communication clients connected to communication session **26** for display at the GUIs of each of the communication devices that include the communication clients. In this way, users participating in communication session **26** may view visual representations of other users participating in the communication session.

In the current example, communication unit **44** may receive a message from a communication client that requests a set of themes that may be selected by the communication client. Theme module **24** may further generate a message that includes a request for themes. Theme module **24** causes communication unit **44** to send the message to a remote device, which may return a set of identifiers that identify selectable themes stored on the remote device. Theme module **24** then causes communication unit **44** to send a message that includes the set of identifiers to the communication client. The user of the communication client may provide a user input to select one or more identifiers, which are in turn sent to server device **10**. Communication unit **44** may receive the selected identifiers, which theme module **24**

12

may then in turn cause communication unit **44** to send to the remote device. The remote device may then select parameters of the themes identified by the selected identifiers. The remote device may send the parameters to server device **10**.

Theme module **24** may receive the parameters via communication unit **44**. Upon receiving the parameters, theme module **24** may send a message to server module **25** to determine which communication clients are connected to communication session **26**. Theme module **24** may receive a set of identifiers of communication clients from server module **25**. Theme module **24** may then cause communication unit **44** to send the parameters to each of the communication clients connected to communication session **26**. The parameters, when received and applied by each of the communication clients, may modify visual properties of GUIs displayed at each of the computing devices executing the communication clients.

Example Interface

FIG. 3 is a block diagram illustrating one example of a graphical display of a communication client, in accordance with one or more aspects of the present disclosure. FIG. 3 includes GUI **12**, which may be an example of GUI **12** as shown in FIG. 1. GUI **12** further includes invitation panel **71**, control panel **80**, rows **76A** and **76B**, and video feed **84**. Invitation panel may further include user selection button **70** and invitation button **72**. Control panel **80** may further include theme selection button **74** and session control buttons **82**. Row **76A** may include video feed **78A** and row **76B** may include video feed **78B**.

As shown in FIG. 3, GUI **12** may include invitation panel **71**. Invitation panel **71** may enable user **2** of FIG. 1 to invite other users to join communication session **26**. Invitation panel **71** may include a user selection button **70** that enables user **2** to initially select other users. For instance, when users **2** selects user selection button **70**, communication module **8** may cause GUI **12** to display identifiers of one or more users or groups of users that user **2** may select for invitation to communication session **26**. After user **2** has selected one or more users, user **2** may further select invitation button **72**. In some examples, when invitation button **72** is selected by user **2**, communication module **8** may send invitations to the selected users.

GUI **12** may further include control panel **80**. Control panel **80** may include one or more session control buttons that enable user **2** to control functions of communication client **6** and client device **4**. For instance, control panel **80** may include session control buttons **82**. Session control buttons **82** may be associated with various functions that may be performed by communications module **8**. Various functions may include muting a camera attached to client device **4**, muting a microphone of computing device **4**, accessing user specified settings of communication client **6**, and/or exiting communication session **26**.

Control panel **80** may include theme selection button **74** that, when selected, enables user **2** to select a theme that may be applied to GUI **12**. For instance, upon selecting theme selection button **74**, communication module **8** may cause GUI **12** to display menu **94** that includes a set of themes that user **2** may select. In some examples, one or more of the themes may be stored on client device **4**, while in other examples, one or more of the themes may be stored on server device **20** or remote device **28**. User **2** may provide a user input to select one or more of the themes, which communication module **8** may apply to graphical elements of GUI **12**. Moreover, communication module **8** may send a message to communication server **22** that user **2** has selected a theme. In some examples, the message may further include

13

parameters of the theme. Communication server 22 may, responsive to receiving the message, send parameters of the selected theme to other communication clients connected to communication session 26.

As shown in FIG. 3, a theme may specify one or more parameters that cause communication module 8 to modify visual properties of GUI 12 displayed at client device 4. In some examples, parameters may cause communication module 8 to display video feeds in a substantially parallel orientation at GUI 12 such as in a row (e.g., horizontal) or a column (e.g., vertical). For instance, user 2 may select a theme that specifies a data that indicates to communication module 8 to display a first video feed group 92A in a first row 76A and a second video feed group 92B in a second row 76B. In one non-limiting example, parameters may include the following structured data that may be processed and applied by communication module 8 to graphical elements of GUI 12. The parameters may be included in a theme that is stored on client device 4, server device 20, and/or remote device 28.

```

1      <group:group1>
2      <row>
3      <element_type:video-feed>
4      <orientation:vertical>
5      <position:left>
6      <size:thumbnail>
7      </row>
8      </group>
9      <group:group2>
10     <row>
11     <element_type:video-feed>
12     <orientation:vertical>
13     <position:right>
14     <size:thumbnail>
15     </row>
16     </group>
17     <trigger:active_speaker>
18     <element_type:video-feed>
19     <position:center>
20     <size:large>
21     </trigger>

```

Lines 1 and 9 of the parameter specify to communication module 8 two different groups identified by group names: group1, group2. Lines 2 and 10 further indicate that communication module 8 will include graphical elements of group1 and group2 in rows. For instance, as shown in FIG. 3, first group of video feeds 78A are included in row 76A and second group of video feeds 92B are included in row 76B. Lines 3 and 11 specify the type of graphical element, e.g., video-feed, to which communication module 8 will apply the parameters. For instance, video feed 76A may be a graphical element of type video-feed. Lines 4 and 12 indicate the orientation of each of rows 76A and 76B is vertical as shown in FIG. 3. Lines 5 and 13 indicate positions of rows 76A and 76B within GUI 12. For instance positions may include enumerated types such as top, bottom, left, right, and center with predefined pixel values. In other examples positions may include absolute x,y coordinates relative to an origin of GUI 12.

Lines 6 and 14 indicate that the size of each video feed, e.g., thumbnail. A size of each graphical element may be specified in pixel dimensions or alternatively according an enumerated type such as thumbnail, small, medium, large, which may each be associated with predefined pixel dimensions. As shown in FIG. 3, a size of video feed 84 may be larger than a size of video feeds included in video feed group 92A.

14

In one example, communication module 8 may receive video feeds from server device 20. Each video feed may include a visual representation of user participation in communication session 26. For instance, user participation may include actions and/or physical appearances of the user that may be recorded or captured by an input device. User participation may also include one or more other physical objects and/or actions of the physical objects that may be recorded or captured by an input device. For instance, user participation may be the user in the video, the user pointing the video at another object or event (e.g., the user's dog, the view out the windows, etc.), a rendered scene by the user (e.g., a shared browser window or computer desktop), etc. Users participating in communication session 26 may each further be associated with a first group or a second group (e.g., video feed group 92A or 92B). For instance, the first group may be identified by a first group identifier attribute and the second group may be identified by a second group identifier attribute. The first group identifier attribute may be different than the second group identifier attribute, in some examples. Each communication client connected to communication session 26 may send to communication server 22 the attribute associated with the user. Communication server 22 may further associate the attribute of each user with the user's video feed. When communication server 22 sends one or more video feeds to communication client 6 connected to communication session 26, communication client 6 may determine, based on the attribute associated with the video feed, which group the video feed is associated with. Communication client 6 may then apply parameters having a group name that matches a group attribute associated with a video feed.

In other examples, communication client 6 may identify the group attribute associated with each video feed. Based on the identity of each group attribute, communication client 6 may further determine the number of unique group attributes of video feeds received from communication server 22. For instance, communication client 6 may determine that each of the video feeds received from communication server 22 is associated with a group attribute of customer or vendor. Consequently, communication client 6 may determine that there are two distinct groups. Because communication client 6 may determine there are two distinct groups, communication client 6 may apply parameters of group1 to video feeds having a group attribute of customer. Communication client 6 may further apply parameters of group2 to video feeds having a group attribute of vendor. Thus, communication client 6 may flexibly and generically apply parameters of a theme to video feeds associated with different group attributes without requiring exact matching of group names of parameters to group attributes associated with video streams.

Line 17 further specifies a trigger with type active_speaker. In some examples, communication module 8 may determine that the position and size specified in <trigger: active_speaker> is applied to a graphical element of type video-feed when an event of type active_speaker is associated with a video feed. Server module 25 may associate an event of type active_speaker with a video feed received from a computing device that is sending audio data based on an audio signal provided by a user to communication session 26. For instance, server module 25 may associate an active_speaker event with a video stream of a user that is presently speaking, e.g., providing an audio signal to generate audio data, in communication session 26. Server module 25 may send the event to communication module 8, which may determine, based the trigger of Line 18

15

of the parameter, to position the video feed, e.g., video feed **84**, of the active speaker in the center of GUI **12** (Line **19**) and display the video feed as a size of type large (Line **20**). Thus, as shown in FIG. 3, row **76A** may be positioned at an opposite side of GUI **12** from the side row **76B** is positioned. Video feed **84**, as shown in FIG. 3, may be positioned between row **76A** and **76B**. In other examples, parameters may indicate that each of the video feeds is of the same size and the video feeds are displayed by output device **10** in substantially parallel rows. For instance, communication client **6** may cause four video feeds to be displayed in GUI **12** as a 2x2 matrix of video feeds, wherein each video feed is of the same size and each of the row of two video feeds is substantially parallel (e.g., horizontally) to the other.

Other examples of triggers may include a trigger that specifies a computing device that initiated the communication session. For instance, the trigger may cause communication client **6** to display the video feed of the computing device that initiated the communication session as a video feed having a size that is larger than other video feeds included in the GUI.

In some examples, one or more parameters specify that a computing device superimpose graphical content for display on a selected video feed of the plurality of video feeds at the GUI. In some examples, the parameters may indicate the graphical content is superimposed on a graphical element when server device **20** receives an event. For instance, graphical content may include an image **90** that is superimposed on a video feed in GUI **12**. In one example, image **90** is superimposed on the video feed when the audio data associated with the video feed has been muted. For instance, the user of the computing device that generates the video feed may provide a user input that mutes the audio data associated with the video feed. Upon muting the audio data, the computing device may send an event to communication server **22**. Communication server **22** may send the event to client device **4**. Client module **8** may receive the event and based on a parameter of a theme associated with the event, client module **8** may cause output device **10** to display image **90** as superimposed on the video feed. In one example, a theme may “black out” video feeds of users when an event occurs, e.g., a first user mutes his or her web camera or a second user provides a user input to block the video feed of the first user from being displayed at the second user’s computing device.

In some examples, a parameter of a theme indicates that a computing device may modify at least one audio stream of a plurality of audio streams generated by the computing devices. For instance, communication server **22** may send a plurality of audio streams to computing devices connected to communication session **26** for output at a plurality of output devices of the computing devices. The audio streams may include, for example, audio data generated from audio signals provided by each user. In one example, a parameter of a theme stored on server device **20** may specify that a volume level of an audio stream associated with the current speaker is increased. In another example, a parameter may specify that a volume level of each audio stream associated with a computing device of a user that is not speaking is muted.

In one example, user **38A** may currently be speaking. Consequently, client device **34A** receives the audio signal of user **38A**’s voice and converts the signal to audio data. Communication client **36A** sends the audio data as an audio stream to communication server **22**. Upon receiving the stream, theme module **24** may associate an active_speaker event with the audio stream. The active_speaker event

16

indicates the audio stream is associated with an audio stream of an active_speaker. Server module **25** may send the audio stream and active_speaker event to each of client devices **4** and **38B**. Communication client **6**, for example, may receive the audio stream and active_speaker event. Communication client **6** may further determine that a parameter of a theme presently applied by communication client **6** causes communication client **6** to increase the volume of the audio stream associated with the active_speaker event.

Example Operations

FIG. 4 is a flowchart illustrating an example operation that includes a server device that sends parameters to the computing devices connected to a communication session to concurrently modify visual properties of GUIs displayed at each of the computing devices, in accordance with one or more aspects of the present disclosure. The example operations as described in FIG. 4 may be performed by client device **4**, server device **20**, remote device **28**, and client device **34B** of FIG. 1. As shown in FIG. 4, client device **4** may send a request to initiate a communication on server device **20** (**100**). Upon receiving the request, server device **20** may establish a communication session and generate session data associated with the communication session (**102**). For instance, session data may indicate that client device **4** is connected to the communication session and further that client device **34A** is permitted to join the communication session. At a later time, client device **34A** may join the communication session (**104**), e.g., after receiving an invitation from client device **4** or discovering the communication session in a feed.

The user of client device **4** may wish to change the look and feel of GUIs of each communication client executing on client devices connected to the communication session. Consequently, user may provide a user input that selects a theme and causes client device **4** to send a message that indicates the selected theme to server device **20** (**106**). Server device **20** may subsequently receive the theme selection (**108**). Upon receiving the theme selection, server device **20** may send a message, for example, a configuration request that indicates the selected theme to remote device **28** (**112**). Remote device **28** as shown in FIG. 1, may store one or more themes. Upon receiving the configuration request from server device **20**, remote device **28** may select the parameters of the theme and send the parameters to server device **20** (**114**).

Server device **20** may subsequent receive the theme parameters (**116**). Upon receiving the theme parameters, server device **20** may determine which client devices are connected to the communication session. Server device **20**, upon determining which client devices are connected to the communication session, may send the theme parameters to each of the connected client devices (**118**). In the current example, client device **4** receives the theme parameters from server device **20** (**120**). Client device **4** may then apply the theme parameters thereby modifying visual properties of one or more graphical elements included in the GUI generated by client device **4** (**122**). Client device **34A** also receives theme parameters from server device **20** (**124**). Client device **34A** may then similarly apply the theme parameters thereby modifying visual properties of one or more graphical elements included in the GUI generated by client device **34A** (**126**).

Example Operations

FIG. 5 is a flow diagram illustrating an example operation that may be performed by a computing device to send a set of parameters to computing devices connected to a communication session to concurrently modify visual properties of

GUIs displayed at each of the plurality of computing devices, in accordance with one or more aspects of the present disclosure. The example operation illustrated in FIG. 5 may be performed by server device 20 shown in FIGS. 1 and/or 2. The operation of FIG. 5 includes sending, by a computing device, a plurality of video feeds for display at a plurality of graphical user interfaces (GUIs) of computing devices connected to a communication session, wherein the communication session enables communication among a plurality of users, and wherein each of the plurality of video feeds includes a visual representation of a user participating in the communication session (130). The operation of FIG. 5 also includes receiving, by the computing device, a set of parameters of a theme to modify one or more visual properties of the GUIs (132). The operation further includes sending, by the computing device, the set of parameters to the computing devices connected to the communication session to concurrently modify visual properties of GUIs displaying the plurality of video feeds at each of the plurality of computing devices (134).

In one example, the method includes sending, by the computing device, a request that identifies the theme to a remote server that stores a plurality of themes; and receiving, by the computing device, the set of parameters of the theme. In one example, the one or more visual properties of the communication session include graphical positions of each of the plurality of visual feeds in the graphical user interface. In another example, the one or more visual properties of the communication session include graphical orientations of each of the plurality of visual feeds in the graphical user interface. In one example, the one or more visual properties of the communication session include sizes of each of the plurality of visual feeds in the graphical user interface.

In one example, the graphical user interface includes one or more graphical elements, and wherein the one or more visual properties of the communication session include one or more colors of the one or more graphical elements. In another example, one or more graphical elements include at least one of a background image, text, control buttons, input field, or scrollbar. In one example, the set of parameters specify data that indicates to the plurality of computing devices to display each of the plurality of video feeds as a first size at the GUI, and the data indicates of parameters to the plurality of computing devices to display the plurality of video feeds in a substantially parallel orientation at the GUI.

In one example, the set of parameters specify data that indicates to the plurality of computing devices to display the plurality of video feeds in a substantially parallel orientation at the GUI; the data indicates to the plurality of computing devices to select a video feed of the plurality of video feeds, wherein the selected video feed is associated with a second computing device that generates audio data based on an audio signal provided by a user; and the data indicates to the plurality of computing devices to display at the GUI the selected video feed as a first size and the plurality of video feeds as a second size, wherein the first size is larger than the second size. In one example, the data further indicates to the plurality of computing devices to display the plurality of video feeds adjacent to a side of the GUI.

In one example, the set of parameters specify data that indicates to the plurality of computing devices to display a first group of the plurality of video feeds in a first substantially parallel orientation at a first location the GUI and a second group of the plurality of video feeds in a second substantially parallel orientation at a second location of the GUI; the data indicates to the plurality of computing devices

to select a video feed of the plurality of video feeds, wherein the selected video feed is associated with a second computing device that is sending audio data based on an audio signal provided by a user to the communication session; the data indicates to the plurality of computing devices to display at the GUI the selected video feed as a first size and the plurality of video feeds as a second size, wherein the first size is larger than the second size; the data indicates to the plurality of computing devices to display at the GUI the first group of the plurality of video feeds adjacent to a first side of the GUI and the second group of the plurality of video feeds adjacent to a second side of the GUI, wherein the first side and the second side include opposite sides of the GUI, and the data indicates to the plurality of computing devices to display at the GUI the selected video feed between the first group of the plurality of video feeds and the second group of the plurality of video feeds.

In one example, the first group of the plurality of video feeds are associated with a first attribute; the second group of the plurality of video feeds are associated with a second attribute; and the first attribute is not equal to the second attribute. In one example, the first attribute indicates a first group of users, wherein each user of the first group of users is related to users of the first group of users and the second attribute indicates a second group of users, wherein each user of the second group of users is related to users of the second group of users.

In one example, the set of parameters specify data that indicates to the plurality of computing devices to display the plurality of video feeds in a substantially parallel orientation at the GUI; the data indicates to the plurality of computing devices to select a video feed of the plurality of video feeds, wherein the selected video feed is associated with a second computing device that initiated the communication session; and the data indicates to the plurality of computing devices to display at the GUI the selected video feed as a first size and the plurality of video feeds as a second size, wherein the first size is larger than the second size. In one example, the set of parameters specify data that indicates to the plurality of computing devices to superimpose a graphical content for display on a selected video feed of the plurality of video feeds at the GUI when an event is received by the computing device.

In one example, the event includes muting a microphone of one of the plurality of computing devices, and wherein the graphical element includes an image. In one example, the method includes detecting, by the computing device, an event associated with a trigger of the theme, wherein the trigger specifies data that modifies visual properties of the GUIs displayed the plurality of computing devices; and responsive to detecting the event, storing, by the computing device, the data in the set of parameters. In one example, the event indicates that a new computing device has connected to the communication session to enable communication between a new user of the new computing device and the plurality of users of the computing devices. In one example, a parameter of the set of parameters of the theme indicates to the plurality of computing devices to modify at least one audio stream of a plurality of audio streams generated by the computing devices, wherein the computing device sends the plurality of audio streams to computing devices connected to the communication session for output at a plurality of output devices of the computing devices.

The techniques described in this disclosure may be implemented, at least in part, in hardware, software, firmware, or any combination thereof. For example, various aspects of the described techniques may be implemented within one or

more processors, including one or more microprocessors, digital signal processors (DSPs), application specific integrated circuits (ASICs), field programmable gate arrays (FPGAs), or any other equivalent integrated or discrete logic circuitry, as well as any combinations of such components. The term “processor” or “processing circuitry” may generally refer to any of the foregoing logic circuitry, alone or in combination with other logic circuitry, or any other equivalent circuitry. A control unit including hardware may also perform one or more of the techniques of this disclosure.

Such hardware, software, and firmware may be implemented within the same device or within separate devices to support the various techniques described in this disclosure. In addition, any of the described units, modules or components may be implemented together or separately as discrete but interoperable logic devices. Depiction of different features as modules or units is intended to highlight different functional aspects and does not necessarily imply that such modules or units must be realized by separate hardware, firmware, or software components. Rather, functionality associated with one or more modules or units may be performed by separate hardware, firmware, or software components, or integrated within common or separate hardware, firmware, or software components.

The techniques described in this disclosure may also be embodied or encoded in an article of manufacture including a computer-readable storage medium encoded with instructions. Instructions embedded or encoded in an article of manufacture including a computer-readable storage medium encoded, may cause one or more programmable processors, or other processors, to implement one or more of the techniques described herein, such as when instructions included or encoded in the computer-readable storage medium are executed by the one or more processors. Computer readable storage media may include random access memory (RAM), read only memory (ROM), programmable read only memory (PROM), erasable programmable read only memory (EPROM), electronically erasable programmable read only memory (EEPROM), flash memory, a hard disk, a compact disc ROM (CD-ROM), a floppy disk, a cassette, magnetic media, optical media, or other computer readable media. In some examples, an article of manufacture may include one or more computer-readable storage media.

In some examples, a computer-readable storage medium may include a non-transitory medium. The term “non-transitory” may indicate that the storage medium is not embodied in a carrier wave or a propagated signal. In certain examples, a non-transitory storage medium may store data that can, over time, change (e.g., in RAM or cache).

Various examples have been described. These and other examples are within the scope of the following claims.

What is claimed is:

1. A computer-implemented method comprising:

in response to input from a source computing device associated with a source user, initiating, by a computing system having one or more processors, a videoconference session;

coordinating, by the computing system, joining of the videoconference session by a plurality of computing devices associated with a plurality of users, the pluralities of computing devices and users including the source computing device and source user, respectively, each computing device displaying a graphical user interface (GUI) for the videoconference session upon joining, each GUI having a set of visual properties

including at least a layout of video windows for respective video feeds from the plurality of computing devices;

based on respective group identifier attributes, identifying, by the computing system, distinct first and second groups of the plurality of computing devices associated with first and second groups of the plurality of users, respectively;

during the videoconference session, detecting, by the computing system, a trigger condition associated with a theme for modifying at least the layout of the video windows in the GUIs of the plurality of computing devices, wherein the layout specified by the theme groups the video windows for the first and second groups of computing devices in specific areas in the GUIs; and

in response to detecting the trigger condition, coordinating, by the computing system, modification of at least the layout video windows in the GUIs at the plurality of computing devices.

2. The computer-implemented method of claim 1, further comprising:

receiving, at the computing system and from the source computing device, a request for a list of a set of themes stored at the computing system;

outputting, from the computing system to the source computing device, the list of the set of themes stored at the computing system; and

receiving, at the computing system from the source computing device, a selection from the list of the set of themes stored at the computing system to obtain the theme.

3. The computer-implemented method of claim 2, wherein the trigger condition includes obtaining the theme by receiving the selection from the source computing device from the list of the set of themes stored at the computing system.

4. The computer-implemented method of claim 1, wherein the trigger condition includes at least one of the plurality of computing devices joining the videoconference session.

5. The computer-implemented method of claim 4, wherein the trigger condition includes the source computing device joining the videoconference session, and wherein the theme specifies increasing a size of a video window for a video feed from the source computing device in the GUIs at the plurality of computing devices.

6. The computer-implemented method of claim 1, wherein the trigger condition includes a predetermined time.

7. The computer-implemented method of claim 1, wherein the theme further specifies modifying at least one audio stream of the videoconference session.

8. The computer-implemented method of claim 7, further comprising:

receiving, at the computing system from the plurality of computing devices, a plurality of audio feeds indicative of speech from the plurality of users, respectively;

detecting, by the computing system, a primary speaker of the plurality of users based on the plurality of audio feeds; and

in response to detecting the trigger condition, coordinating, by the computing system, augmentation of the audio feed associated with the primary speaker.

9. The computer-implemented method of claim 1, at least one of a chrominance and a luminance of at least one of the plurality of video feeds.

21

10. The computer-implemented method of claim 1, wherein the layout specifies arranging the video windows for the video feeds from the first group of the plurality of computing devices in a left column in a left area of the GUIs, and wherein the layout specifies arranging the video windows for the video feeds from the second group of the plurality of computing devices in a right column in a right area of the GUIs.

11. The computer-implemented method of claim 1, wherein the group identifier attributes indicate a first user type for each of the first group of users, wherein the second group identifier attributes indicate a different second user type for each of the second group of users, and wherein the first and second user types are with respect to a context of the videoconference session.

12. A computing system having one or more processors configured to perform operations comprising:

in response to input from a source computing device associated with a source user, initiating a videoconference session;

coordinating joining of the videoconference session by a plurality of computing devices associated with a plurality of users, the pluralities of computing devices and users including the source computing device and the source user, respectively, each computing device displaying a graphical user interface (GUI) for the videoconference session upon joining, each GUI having a set of visual properties including at least a layout of video windows for respective video feeds from the plurality of computing devices;

based on respective group identifier attributes, identifying distinct first and second groups of the plurality of computing devices associated with first and second groups of the plurality of users, respectively;

during the videoconference session, detecting a trigger condition associated with a theme for modifying at least the layout of the video windows in the GUIs of the plurality of computing devices, wherein the layout specified by the theme groups the video windows for the first and second groups of computing devices in specific areas in the GUIs; and

in response to detecting the trigger condition, coordinating modification of at least the layout video windows in the GUIs at the plurality of computing devices.

13. The computing system of claim 12, further comprising:

receiving, from the source computing device, a request for a list of a set of themes stored at the computing system; outputting, to the source computing device, the list of the set of themes stored at the computing system; and

22

receiving, from the source computing device, a selection from the list of the set of themes stored at the computing system to obtain the theme.

14. The computing system of claim 13, wherein the trigger condition includes obtaining the theme by receiving the selection from the source computing device from the list of the set of themes stored at the computing system.

15. The computing system of claim 12, wherein the trigger condition includes at least one of the plurality of computing devices joining the videoconference session.

16. The computing system of claim 15, wherein the trigger condition includes the source computing device joining the videoconference session, and wherein the theme specifies increasing a size of a video window for a video feed from the source computing device in the GUIs at the plurality of computing devices.

17. The computing system of claim 12, wherein the trigger condition includes a predetermined time.

18. The computing system of claim 12, wherein the theme further specifies modifying at least one audio stream of the videoconference session.

19. The computing system of claim 18, further comprising:

receiving, from the plurality of computing devices, a plurality of audio feeds indicative of speech from the plurality of users, respectively;

detecting a primary speaker of the plurality of users based on the plurality of audio feeds; and

in response to detecting the trigger condition, coordinating augmentation of the audio feed associated with the primary speaker.

20. The computing system of claim 12, wherein the set of visual properties includes at least one of a chrominance and a luminance of at least one of the plurality of video feeds.

21. The computing system of claim 12, wherein the layout specifies arranging the video windows for the video feeds from the first group of the plurality of computing devices in a left column in a left area of the GUIs, and wherein the layout specifies arranging the video windows for the video feeds from the second group of the plurality of computing devices in a right column in a right area of the GUIs.

22. The computing system of claim 12, wherein the group identifier attributes indicate a first user type for each of the first group of users, wherein the second group identifier attributes indicate a different second user type for each of the second group of users, and wherein the first and second user types are with respect to a context of the videoconference session.

* * * * *